[0095] As noted above, another feature may be provided apart from the Management Object aspects described above. An indication may be introduced in the session management signaling of 3GPP specification (NAS protocol, the new WLAN Control Protocol, and equivalent protocols) to allow the UE to indicate, when requesting an additional PDN connection, that such PDN connection is for MPTCP use. Such indication is relevant in the UE Requested PDN Connectivity Request procedure [such as similar to chapter 5.10.2. in TS23.401 for example]. The similar type of protocol and the corresponding procedures and node behavior for PDN connection management (i.e., session management) for PDN connections over the WLAN access is yet to be defined in the current 3GPP specification. For a S2c interface based interworking, the indication of the MPTCP in the corresponding protocol signaling may still be beneficial for the similar reason as in the S2a/b scenario. For example, this may be where the UE is either receiving the available P-GW addresses in Protocol Configuration Options (PCO) and then selecting the P-GW itself, or is using IKEv2 protocol for setting up the tunnels for PDN connections over the WLAN access, or is using DHCP or DNS interactions for discovering the P-GW. The network (e.g., AAA, ePDG) may be made aware of the reason for selecting a different P-GW.

[0096] Once the network receives a request for an additional PDN connection for MPTCP, the PDN Gateway selection function may be performed in a new and novel way. Instead of rejecting the new PDN connection request based on the condition where the UE already has a PDN connection for the same APN over a different access network, the network may now acknowledge the need for the new connection and select the PDN Gateway accordingly. Provided that the Mobile Network Operator's deployment supports multiple P-GWs for the same APN, the selection logic may then be performed in a novel way where the APN is mapped to a different P-GW from the one where the UE's existing PDN connection has been created for the same APN. This way the MNO can benefit from the more distributed routing of the UE's internet traffic.

[0097] In one deployment scenario the MNO may have prepared the network for MPTCP and implemented the above mentioned capabilities there. The MNO may indicate this to the UEs by adding the information in the ANDSF MO as described earlier. In this deployment the UE's do not have to support the new indication of MPTCP in the PDN connection requests. Instead, the network may implicitly assume that the UE is requesting a duplicate PDN connection for MPTCP use.

[0098] With features as described herein, the UE may be aware of the networks where MPTCP is allowed or is not allowed. This may insure a successful creation of parallel PDN connection(s); for the UE's MPTCP protocol implementation to use those connections for multipath TCP. In cases where the UEs are prepared for MPTCP use, this may insure the allowance of a beneficial network deployment/configuration from the Mobile Network Operator's viewpoint in their core network routing. This may insure MPTCP operation in a trusted and collaborative manner over the selected 3GPP and non-3GPP accesses. Without features as described herein, the benefits of MPTCP may not become available for 3GPP, because the radio access selection may not support routing a flow of the same TCP connection using multiple IP addresses via two paths over the radio access networks.

[0099] The MO with its MPTCP rules and conditions may be executed by the UE. MPTCP between a UE and server may become established using the ANDSF MO guidance for the access selection. MPTCP may be observed from a single TCP port (source and destination) using subflows of two IP addresses implementing the multipath transmission. MPTCP is defined to handle the establishment of subflows over multiple IP addresses. It is also defined to be able to drop one of its serving IP addresses not serving the MPTCP port any more, which resembles the operation of a conventional TCP. Adding and dropping, hence changing, IP addresses and subflows of a MPTCP connection is feasible during the lifetime of a MPTCP connection. For the link path management, MPTCP runs joint-congestion control algorithms in place of the congestion control algorithms of the conventional TCP. Joint-congestion control algorithms provide faster link ramp-up, higher reachable throughput and more robust transmissions.

[0100] UE connectivity and ANDSF MO may be provided by the network and implemented in the UE. Session management protocol information and procedures may be provided in the network element implementations in MME, in WLAN Access Gateway (e.g. a Trusted WLAN Access Gateway), in AAA server.

[0101] Referring also to FIG. **6**, a wireless communication system **230** may comprise communication stations **220** which form cells. Some of the cells overlap one another. The user equipment (UE) **12** may move in and out of the various cells as the UE **12** travels. In the wireless system **230** a wireless network **235** is adapted for communication over a wireless link **232** with an apparatus, such as a mobile communication device which may be referred to as a UE **12**, via a network access node, such as a Node B (base station), and more specifically an eNB **220**. The network **235** may include a network control element (NCE) **240** that may include MME/gateway (SGW) functionality, and which provides connectivity with a network, such as a PDN, a voice/muiltimedia network (IMS) and/or a data communications network (e.g., the internet **20**).

[0102] The UE **12** includes a controller, such as a computer or a data processor (DP) **214**, a computer-readable memory medium embodied as a memory (MEM) **216** that stores a program of computer instructions (PROG) **218**, and a suitable wireless interface, such as radio frequency (RF) transceiver **212**, for bidirectional wireless communications with the eNB **220** via one or more antennas.

[0103] The eNB **220** also includes a controller, such as a computer or a data processor (DP) **224**, a computer-readable memory medium embodied as a memory (MEM) **226** that stores a program of computer instructions (PROG) **228**, and a suitable wireless interface, such as RF transceiver **222**, for communication with the UE **12** via one or more antennas. The eNB **220** is coupled via a data/control path **234** to the NCE **240**. The path **234** may be implemented as an interface. The eNB **220** may also be coupled to another eNB via data/control path **236**, which may be implemented as an interface.

[0104] The NCE **240** includes a controller, such as a computer or a data processor (DP) **244**, a computer-readable memory medium embodied as a memory (MEM) **246** that stores a program of computer instructions (PROG) **248**.